REMARKS

Reconsideration of this application is respectfully requested. To this end, a Request for Continued Examination is being filed with this Amendment After Final Rejection.

Claims 1, 5, 13 and 21 – 29 are pending in the application. Upon entry of this Amendment, independent claim 1 and dependent claims 21-24 will be amended.

The Examiner is thanked for indicating in the outstanding Office Action that independent claims 5 and 13 are allowed. Accordingly, no further comments regarding these claims will be made in this Amendment.

The Examiner is also thanked for allowing the undersigned and Mr. Johan Bouvin, a representative of Tobii Technology AB, the Assignee of this application, to interview this application with the Examiner last Thursday, March 5, 2009, and for allowing Mr. Bouvin to demonstrate an eye detection apparatus that embodies the claimed invention of the present application. The Examiner is further thanked for acknowledging at the interview that amended claim 1, a copy of which was provided to the Examiner at the interview, would not be anticipated by Hutchinson *et al.* (USPN 6,152,563). The arguments against anticipation of claim 1 by Hutchinson presented to the Examiner at the interview are, in effect, the comments regarding anticipation presented in the "Remarks" section of this Amendment.

In the outstanding Final Office Action, the Examiner rejected claims 1, 24, 25 and 28 under 35 U.S.C. §102(b), as being anticipated by Hutchinson *et al.* The Examiner also rejected, as being unpatentable under 35 U.S.C. §103(a), claim 22 over Hutchinson in view of Ueno (USPN 5,239,427), and claims 26, 27 and 29 over Hutchinson as applied to claim 1, and further in view of Lemelson *et al.* (USPN 6,421,064). The Examiner's rejections are respectfully traversed.

For a claim to be anticipated by a reference under §102(b), every limitation recited in the claim must be disclosed in the reference. For a claimed invention to be obvious under §103(a) over a combination of references, there must have been some reason for one of ordinary skill in the art to combine the cited references to produce the claimed invention.

Here, claims 1, 24, 25 and 28 are not anticipated by Hutchinson because Hutchinson fails to disclose all of the limitations recited in such claims, as discussed below. And, even assuming, *arguendo*, that the Examiner properly combined Hutchinson with the Ueno and/or Lemelson references, claim 22 is not obvious over the combination of Hutchinson and Ueno, and claims 26, 27 and 29 are not obvious over the combination of Hutchinson and Lemelson because the resulting combination would not be the claimed invention as a result of the deficiencies in the teachings of the primary Hutchinson reference discussed below.

Independent claim 1, the only independent claim of the present application that stands rejected, is directed to an eye detection installation that determines eye gaze direction and eye position. The eye detection installation of claim 1 is comprised of one or more light sources, a detector for receiving light from the head of a user and to repeatedly capture pictures thereof, and an evaluation unit connected to the detector for determining the position and/or gaze direction of an eye or eyes. The evaluation unit also determines, in a picture captured by the detector, an area in which an image of an eye or images of eyes is/are located, and, after having determined the area, controls the detector to forward to the evaluation unit information about successive or following pictures that only corresponds to the determined area of the image captured by the detector.

Independent claim 1 of the present application has been amended to clarify:

(1) that the detector has a light sensitive surface comprising a plurality of picture elements, and

(2) that the detector reads out information from that portion of the detector surface that corresponds to the determined area in which an image of an eye or images of eyes is/are located, with the determined area representing less than all the picture elements of the light sensitive surface.

Hence, claim 1 has been amended to clarify that only data from a determined area in which an image of an eye or images of eyes is/are located, and which is less than all

the picture elements of the detector's light sensitive surface, are forwarded by the detector to an evaluation unit.

Amended independent claim 1 of the present application is not anticipated by Hutchinson because Hutchinson does not disclose system that determines eye position or that, in determining eye gaze direction, reads out data which is less than the entire picture registered by Hutchinson's camera, much less that only data from a determined area in which an image of an eye or images of eyes is/are located are forwarded by a detector to an evaluation unit, as now recited in amended independent claim 1 of the present application.

Hutchinson purports to disclose a system for eye-gaze direction detection, but not eye position. Hutchinson's system uses an infrared light emitting diode mounted coaxially with the optical axis and in front of the imaging lens of an infrared sensitive video camera for remotely recording images of the eye of a system operator. *See* Hutchinson, col. 4, lns. 35-67 and Figure 1.

Hutchinson's system also includes a computer with software and hardware that acquires video images of the eye, digitizes each image into a matrix of pixels, and then analyzes the matrix to identify the location of the center of the eye's pupil relative to the center of a glint that is formed on the surface of the eye's cornea. Installed inside the computer is a frame grabber card that acquires images from the video camera, digitizes

each image into a sequence of pixels, and maps those pixel values into system memory, resulting in a 640 X 480 resolution image with each pixel having a value from 0 to 255, with 0 being black and 255 being white and intensity values in between representing different shades of gray. Hutchinson, col. 5, lns. 14-22.

After setting thresholds for pupil and glint, then calibrating the system to map angles and radii between pupil and glint centers, *see* Hutchinson, generally at cols. 5-9, the system is enabled to determine an operator's eye gaze, *see* Hutchinson, generally at col. 9. In this regard, Hutchinson notes:

> When the system is enabled, a timer starts that signals the system to acquire images at a frequency corresponding to the sampling rate. Once the image has been mapped into memory, the software uses the routines described above to determine the bounding rectangle for both the glint and the pupil. To speed up the search process, the system has two searching modes--local and global search.

See Hutchinson, col. 9, ln. 56 to col. 10, ln. 12 (Emphasis added).

Given Hutchinson's description of the process of "mapping an image into memory" *see* Hutchinson, col. 5, lns. 14-22, his maximum sampling rate of 15 samples per second, and his use of "local and global searches" of his camera's image "to speed up the search process" for pupil and glint images, it is clear that Hutchinson does not disclose a system in which less than the entire image captured by his camera is mapped into memory for searching. As such, Hutchinson does not anticipate the eye detection

installation of claim 1 of the present application, in which only data from a determined area in which an image of an eye or images of eyes is/are located, and which is less than all the picture elements of the detector's light sensitive surface, are forwarded by the detector to an evaluation unit. Use of a determined area which is less than all the picture elements of the detector's light sensitive surface allows the eye detection installation of claim 1 to use less bandwidth to send data from the detector to memory and to sample the image of an eye more frequently.

Thus, Hutchinson clearly does not anticipate amended claim 1 of the present application. And with regard to the Examiner's rejection of dependent claims 24, 25 and 28 of the present application as being anticipated by Hutchinson, because such claims depend, either directly or indirectly, from claim 1, they are also not anticipated by Hutchinson.

With regard to the Examiner's rejections, under §103(a), of claim 22 as being unpatentable over Hutchinson and Ueno, and claims 26, 27 and 29 as being unpatentable over Hutchinson and Lemelson, given the deficiencies discussed above in the teachings of Hutchinson with regard to amended claim 1, from which these claims depend, for this reason alone, claims 22, 26, 27 and 29 are not obvious over the combination of Hutchinson and Ueno or Lemelson. Nor do the portions of Ueno and Lemelson reasons cited by the Examiner in his §103(a) rejections compensate for the deficiencies in the

teachings of Hutchinson discussed above. Nor do these patents otherwise compensate for the noted deficiencies in the teachings of Hutchinson.

Ueno purports to disclose an eye position detecting system suitable for use in an automotive vehicle, to detect driver's inattentive driving due to a doze or looking aside. As shown in Figure 1 of Ueno, Ueno's system includes an infrared strobe 1. a TV camera 3, a timing circuit 5, an A-D convertor 7, an image memory 9, an eye existing area (window) detecting circuit 10, an iris detecting circuit 13 and an inattentive drive discriminating circuit 15. Ueno, col. 4, lns. 17-21. The infrared strobe 1 is disposed within an instrument panel (not shown) to transmit infrared rays upon a driver face looking correctly frontward. The TV camera 3 takes images of driver face irradiated with the infrared rays emitted from the infrared strobe 1. The timing circuit 5 matches the timing at which the infrared rays are emitted from the strobe 1 with that at which a driver face image is taken by the TV camera 3. Ueno, col. 4, lns. 21-29. The image taken by the TV camera 3 is composed of 520 horizontal (X) direction picture elements (pixels) and 500 vertical (Y) direction picture elements (pixels) as shown in FIG. 4 and the field angle of the image is adjusted so that the whole face appears in the face image. Ueno, col. 4, lns. 36-42. The A-D convertor 7 converts analog image signals obtained by the TV camera 3 into digital image signals, and the image memory 9 stores these digital image signals. The eye existing area (window) detecting section 10 detects an area or areas

within which two eyes exist on the basis of the image signals stored in the image memory 9. Ueno, col. 4, lns. 43-48 (Emphasis added).

Lemelson purports to disclose a system for controlling the automatic scrolling of information on a display or screen. Specifically, Figure 1A of Lemelson shows a human machine interface system 10 for controlling the automatic scrolling of information on a computer display or screen 12. Besides the computer display or screen 12, the system 10 also includes a computer system 14, gimbaled sensor system 16 for following and tracking the position and movement of a user's head 18 and eye 20, and a scroll activating interface algorithm implemented by the computer system 14 so that corresponding scrolling function is performed based upon the gaze direction of the user's eye 20 used to calculate screen gaze coordinates relative to a certain activation area(s) on the display or screen 12. Lemelson, col. 7, lns. 53-65. The gimbaled sensor system 16 has camera(s) 26 or photo sensor(s) 74 having optics 76 and zoom control line 78 for focusing on and obtaining various images of the user's head 18 and eye 20. The camera 26 or photo sensor 74 is coupled to the computer interface card 64 via an image/photosensor interface 80. The signals from image/photo sensor interface 80 are then sent to the to the buffer memory 86 which is attached to computer interface bus 66. Lemelson, col. 11, lns. 37-45 (Emphasis added). A low power infrared laser or LED 77 that is coupled to the optics 76 and also coupled to the light source driver 79 is used to provide and place a glint on the

user's eye 20 to enhance finding the center of the user's eye 20. Lemelson, col. 11, lns. 31-36. The computer interface card 64 functions to receive the relevant information or data relating to the position of the user's head 18 and eye 20 from the gimbaled sensor system 16 and sends this information and data to the memory buffer 86. The memory buffer 86 interfaces with the computer system 14 via a computer interface bus 66, and the computer interface bus 66 is coupled to a display driver 68 (*i.e.,* VGA card). The display driver 68 drives the display system 12. The computer system 14 runs an algorithm used to control the gimbaled sensor system 16 and directs the corresponding hardware to perform desired or commanded functions via the movement of the user's eye 20 or via the user's voice or speech commands. Lemelson, col. 12, lns. 49-61 (Emphasis added).

Thus, clearly, neither Ueno nor Lemelson discloses a system in which less than the entire image captured by Ueno's TV camera or Lemelson's gimbaled sensor system 16 is mapped into memory for searching. As such, claims 22, 26, 27 and 29 are not obvious over the combination of Hutchinson and Ueno or Lemelson.

In view of the foregoing, it is believed that all of the claims remaining in the application, *i.e.*, claims 1, 5, 13 and 21 – 29, are now in condition for allowance, which

action is earnestly solicited. If any issues remain in this application, the Examiner is urged to contact the undersigned at the telephone number listed below.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: Robert A. Molan

Robert A. Molan
Reg. No. 29,834

RAM:drt

901 North Glebe Road, 11th Floor
Arlington, VA 22203
Telephone: (703) 816-4000
Facsimile: (703) 816-4100